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## PLANETARY PHENOMENA FOR JULY AND AUGUST, 1919

By MALCOLM MCNEILL

Pacific "Summer Time" of the phenomena may be obtained by adding one hour to Pacific Time.

## PHASES OF THE MOON, PACIFIC TIME

|                   |   |  |                   |  |
|-------------------|---|--|-------------------|--|
| First Quarter.... | July 4, 7 <sup>h</sup> 17 <sup>m</sup> P.M. |  | First Quarter.... | Aug. 3, 12 <sup>h</sup> 11 <sup>m</sup> P.M. |
| Full Moon.....    | " 12, 10 2 P.M.                             |  | Full Moon.....    | " 11, 9 39 A.M.                              |
| Last Quarter....  | " 20, 3 3 A.M.                              |  | Last Quarter....  | " 18, 7 56 A.M.                              |
| New Moon.....     | " 26, 9 21 P.M.                             |  | New Moon....      | " 25, 7 37 A.M.                              |

The Earth is in aphelion, that is, reaches its greatest distance from the Sun July 3rd, 2 A. M. Pacific Time.

*Mercury* is in good position for evening observation during the last few days of June and the first half of July. On July 1st the planet does not set until nearly an hour and a half after sunset, and the interval does not diminish much until after the middle of the month. Greatest east elongation occurs on July 18th, quite a large one—nearly  $27^{\circ}$ , as aphelion is only a few days distant; but the motion of the planet in its orbit causes it to be a considerable distance south of the Sun, thus causing a shortening of the interval between sunset and the setting of the planet before the date of greatest elongation. Conjunction with the Sun occurs on August 15th, and the planet becomes a morning star, nearly reaching greatest west elongation by the end of the month. The planet then rises about an hour and a half before sunrise, thus being in fine position for morning observation. On the evening of July 6th *Mercury* is a little more than  $1^{\circ}$  north of *Neptune*.

*Venus* is in fine position for evening observation, being above the horizon about two and one-half hours after sunset on July 1st, but the interval diminishes to only a few minutes by the end of August. It reaches greatest east elongation on July 4th, being then  $45^{\circ}$  from the Sun, but as in the case of *Mercury*, the planet's motion is also southward in greater degree than the motion of the Sun, causing a rapid diminution in the interval between sunset and setting of the planet. *Venus* will be at its maximum brightness during the two months, the greatest brilliancy occurring on August 7th, about half way between the times of greatest elongation, July 4th, and of inferior conjunction with the Sun, September 12th. It will, after the Sun and Moon, be by far the brightest object in the sky and may be seen in broad daylight for some weeks about the time of greatest brilliancy. Its "stellar magnitude" during the

last week in July and the first half of August will be  $-4.2$ , that is, it will be nearly fifty times as bright as an ordinary first magnitude star. *Regulus*, the brightest star in *Leo*, is not greatly different in brightness from a normal first magnitude. *Venus* passes a short distance to the north of this star on July 5th.

*Mars* passed conjunction on May 9th, and by July 1st it has attained a sufficient apparent distance from the Sun so that it rises about an hour before sunrise. It is still at nearly its minimum brightness and will therefore hardly be visible in the morning twilight except under unusually favorable weather conditions until some time after July 1st. By August 1st it rises about two hours before sunrise, and at the end of the month nearly three hours before. It will therefore be easily visible thruout August. During the two months it moves about  $44^{\circ}$  eastward from the eastern part of *Taurus* thru *Gemini* into *Cancer*. During early August it is south of *Castor* and *Pollux*, its nearest approach to *Pollux*, the southern and eastern one of the two stars, being about  $6^{\circ}$ , a little more than the distance between the stars. This occurs on August 12th.

*Jupiter* is rather too near the Sun during July and August for easy observation, coming into conjunction with that body on July 20th. On July 1st it sets about an hour after sunset, and on account of its great brightness may be seen for a few days in the evening twilight, but it is soon lost in the Sun's rays, and after passing the Sun at conjunction it becomes a morning star. Shortly after August 1st it rises an hour before sunrise, this interval increasing to nearly three hours by the end of the month.

*Saturn* is still an evening star on July 1st, but its apparent distance from the Sun is rapidly diminishing. At the beginning of July it does not set until two and a half hours after sunset, so it is still in fair position for evening observation. By August 1st it sets only about an hour after sunset and will therefore not be an easy naked-eye object, as it is not nearly as bright as *Jupiter*. It reaches conjunction with the Sun on August 25th, and becomes a morning star, but does not attain a sufficient distance for early morning visibility until some time after the end of the month. During the two months it moves about  $7^{\circ}$  eastward in *Leo*. Toward the end of July it is very close to *Regulus*, the brightest star of the constellation, passing about  $1^{\circ}$  to the north of it on July 30th.

*Uranus* is drawing into fair position for observation, rising about three hours after sunset on July 1st, and about an hour before

sunset on August 31st. It comes to opposition with the Sun on August 23rd, and is then above the horizon the entire night. It moves about  $2^{\circ}$  westward in the constellation *Aquarius* during the two months.

*Neptune* reaches conjunction with the Sun on August 2nd, changing from an evening to a morning star.

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### THE BINARY STARS<sup>1</sup>. A REVIEW

By E. E. BARNARD

The best contribution to the general literature of double stars in recent years is the admirable volume on the subject by Robert Grant Aitken of the Lick Observatory. The presentation of this work has fallen into worthy hands indeed and the result is a book that can be read with much pleasure as well as with profit.

Professor Aitken has given us a work which is not only of permanent value for instruction but is of very deep interest because of the historical information it contains. It will be valuable to the general astronomical reader, as it gives an interesting account of the early history and development of double-star work. To the double-star observer himself it is an excellent source of information concerning the first observers of these stars, about whom he has probably known little enough. Perhaps even some of the regular double-star observers will be surprised to learn how slow the earlier astronomers were to grasp the nature and importance of these objects.

The first double stars discovered, such as  $\gamma$  *Centauri*, *Castor*, etc., were, as would be supposed, found by accident. It is with surprise, however, that we read of the subsequent treatment of these most interesting and important bodies by the early observers. To them a double star was simply two stars seen nearly in the same line of sight and not physically connected in any way and probably vastly distant from each other. Especially was this thought to be the case where one of the stars was brighter than the other. This strange lack of insight into their true nature continued for upward of a hundred years after the first discoveries were made. A strong interest was taken in them, however, and they were sought for and

<sup>1</sup>Robert Grant Aitken, *The Binary Stars*, 1918, 316 pages. Douglas C. McMurtrie, 2929 Broadway, New York. Price \$3.15.